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| EXAMINER |
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LEUNG, JENNIFER A

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| ART UNIT | PAPER NUMBER |
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1764

DATE MAILED: 01/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/934,085

Applicant(s)

SCHUTTE ET AL.

Examiner

Jennifer A. Leung

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 1-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-36 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>3-19-02; 11-19-01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group II, claims 17-36, in the reply filed on October 28, 2004 is acknowledged. The traversal is on the ground(s) that,

“Applicants disagree and note that the process requires the introduction of the reactants into the slot shaped reaction spaces... Hence, it is clear that each of the process steps is dependent upon the structure of the apparatus, and contrary to the Official Action, cannot be practiced by hand or in a fluidized bed.” (page 10, last paragraph, of the remarks).

This is not found persuasive because it is further shown that the apparatus as claimed can be used to practice another and materially different process. As presented in Fink et al. (US 4,153,501), the apparatus as claimed can be used in a process for removing vaporizable constituents from a high-viscosity solution or melt of thermoplastics by continuous evaporation (Abstract; FIGs. 1-3). The requirement is still deemed proper and is therefore made FINAL.

2. Claims 1-16 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 17-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 17, “the plurality of tubular cavities” (line 12) lacks proper positive antecedent basis. Regarding claim 34, “the pressure vessel” (line 2) lacks proper positive antecedent basis.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 17, 19, 20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Schubert et al. (US 5,803,600).

Regarding claim 17, Schubert et al. (FIG. 3b; column 3, lines 48-59) discloses an apparatus comprising a reactor in which there are located a plurality of wall elements (i.e., foil elements **12b**), a plurality of slot-shaped reaction spaces (i.e., partial mixing chambers **12a**), a plurality of cavities for conducting a fluid heat-exchange medium therethrough (i.e., a plurality of parallel, tubular channels **12c** within foil elements **12b** for receiving a cooling or heating medium); wherein the reaction spaces **12a** are formed between lateral surfaces of two abutting wall elements **12b** made of solid plates, arranged interchangeably in a block (i.e., a heat exchanger unit **12**) as a virtual right parallelepiped; wherein the slot-shaped reaction spaces **12a** are able to have reactants **A** and **B** supplied from the same side of the block (as illustrated in FIG. 3b, the left side of the block); and wherein the reaction spaces **12a** are oriented to guide the reaction mixture **C** through the reaction spaces **12a** in the same direction and in parallel flows.

Regarding claim 19, Schubert et al. (FIG. 3b; column 3, lines 7-31, 48-60) discloses a distributing medium (i.e., a flow guide structure **13**, similar to the flow guide structure **6** shown in FIG. 1d) on at least one side of the block **12** through which the reaction spaces **12a** are capable of being provided with the reactants **A**, **B**.

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Regarding claim 20, Schubert et al. discloses the distributing medium **13** (FIG. 3b) is a solid body with a plurality of channels (i.e., passages **13a**, **13b**, similar to the passages **1b**, **2b** of flow guide structure **6** shown in FIG. 1d), the cross-sections of which, inherently, are sufficiently small to avoid spreading of flames in them in the course of the supply of reactants that form an explosive mixture (i.e., the grooves which define passage **13a**, **13b** have a width of less than 250 μm and a depth of less than 70 μm ; claims 1-3).

Regarding claim 22, Schubert et al. (FIG. 3b; column 3, lines 48-60; claims 1-3) discloses the slot width "s" of the reaction spaces **12a** is between 0.05 and 5 mm (as illustrated, the width of a space **12a** is approximately the sum of the foil thicknesses that define channels **13a** and **13b**, which is roughly 200 μm or 0.2 mm).

Instant claims 17, 19, 20 and 22 structurally read on the apparatus of Schubert et al.

5. Claims 17, 23-25 and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Haselden (US 3,528,783).

Regarding claims 17 and 23, Haselden (FIG. 1; claims 1-11; generally, column 1, lines 14-35; column 3, lines 6-38) discloses an apparatus comprising a reactor in which there are located a plurality of wall elements (i.e., heat transfer panels **1**), a plurality of slot-shaped reaction spaces (i.e., the spaces between adjacent panels **1**, including a layer of granular catalyst **16**), and a plurality of cavities for conducting a fluid heat-exchange medium therethrough (i.e., tubular, parallel, channels within each of panels **1**, as defined by corrugated metal matrix **12**); wherein each of said slot-shaped reaction spaces **16** are formed between lateral surfaces of two abutting wall elements **1** made of solid plates (i.e., solid, flat metal plates **13**); and wherein the walls elements **1** are arranged interchangeably in a block within a virtual right parallelepiped (see

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FIG. 1; column 3, lines 16-33; column 2, lines 49-54). Although not specifically illustrated, the slot-shaped reaction spaces 16 are inherently able to have reactants supplied from the same side of the block, to guide the flow of the reaction mixture through the reaction spaces 16 in the same direction, as evidenced by the disclosure that,

“... the side edges of the catalyst chambers are sealed by attaching separate metal edge strips, or by welding or otherwise bonding together the aforementioned flanges 14 at the side edges of the panels 11... The edges of the catalyst layers through which the reactants are to enter and leave must not, of course, be sealed by they may be covered by a gauze or other porous barrier to keep the catalyst in place.

The reactor is completed by coupling the connections of the heat transfer panels to appropriate manifolds, and attaching header boxes for delivering the reactant feed to, and collecting the product flow from, the catalyst chambers.”

(see column 3, lines 30-38). The slot-shaped reaction spaces 16 are also inherently oriented to guide the reaction mixture in parallel flows, as evidenced by the provision of a plurality of parallel intervening layers of catalyst between each of parallel panels 1 (e.g., at least five parallel reaction spaces 16 are recited in claim 1).

Regarding claim 24, Haselden discloses that the lateral surfaces of the wall elements facing towards the reaction spaces are at least partially coated with catalyst material (e.g., “To maintain a regular spacing between the cylindrical catalyst pellets an adhesive may be used between the pellets and the bounding panel plates,” column 3, lines 53-55).

Regarding claim 25, Haselden further discloses the lateral surfaces of the wall elements 1 facing towards the reaction spaces 16 being provided with a profiled structure for the purpose of enlarging the surface area (e.g., “If desired, the panels can be finned to improve thermal contact with the catalyst,” column 4, lines 3-18).

Regarding claim 33, Haselden further discloses the wall elements 1 being accommodated

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as a block in a pressure vessel (e.g., "If a reaction is to be carried out at high pressure the sandwich reaction block can be housed in a cylindrical metal shell," column 4, lines 71-75).

Instant claims 17, 23-25 and 33 structurally read on the apparatus of Haselden.

6. Claims 17, 23 and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Vu et al. (US 4,820,495).

Vu et al. (FIG. 1, 2, 2A; column 2, line 10 to column 3, line 12) discloses an apparatus comprising a reactor (i.e., a pressure vessel 8) in which there are located a plurality of wall elements (i.e., parallel heat exchange plates 9), a plurality of slot-shaped reaction spaces (i.e., the spaces between each of plates 9, containing a bed of solid catalyst 19), and a plurality cavities for conducting a fluid heat-exchange medium therethrough (i.e., parallel, tubular channels E or F for conducting a fluid heat carrier via lines 10, 11, 13, 15); wherein each of said slot-shaped reaction spaces are formed between lateral surfaces of two abutting, substantially equally large and substantially right-parallelepipedal wall elements 9 made of solid plates that are interchangeably arranged in a block within a virtual right parallelepiped (see Abstract); and wherein the slot-shaped reaction spaces are able to have the reactants supplied from the same side of the block (i.e., via line 18), and being oriented to guide the reaction mixture through the reaction spaces in the same direction and in parallel flows (i.e., as shown in FIG. 1, downward flow through the plurality of parallel, catalyst 19 containing spaces between plates 9).

Instant claims 17, 23 and 33 structurally read on the apparatus of Vu et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 17-20, 22-30 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashmead et al. (US 5,690,763).

Regarding claim 17, Ashmead et al. discloses an apparatus comprising a reactor in which there are located a plurality of wall elements (i.e., a plurality of laminae 100-1100; FIG. 1), a plurality of slot-shaped reaction spaces (i.e., a plurality of slot shaped catalytic reaction channels 90-1' to 90-8'; FIG. 16; column 12, line 66 to column 13, line 8), and a plurality of parallel cavities for conducting a fluid heat-exchange medium therethrough (i.e., heat exchanger assemblies 74, 86; FIG. 10, 13, 14; column 11, line 58 to column 12, line 7; column 12, lines 33-45), wherein the said slot-shaped reaction spaces 90-1' to 90-8' are formed between lateral surfaces of two abutting, substantially equally large wall elements made of solid plates (i.e., labeled as plates 1000 and 1100 in FIG. 16), wherein the wall elements being arranged interchangeably in a block (see FIG. 1); wherein the slot-shaped reaction spaces 90-1' to 90-8' are able to have the reactants supplied from the same side of the block (i.e., via chamber 90C1'; FIG. 16), to guide the reaction mixture through the reaction spaces in the same direction and in

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parallel flows. Although Ashmead et al. is silent as to, specifically, right-parallelepipedal wall elements and tubular shaped heat exchanger cavities, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select such geometries for the wall elements and heat exchanger cavities in the apparatus of Ashmead et al., on the basis of suitability for the intended use, because changes in shape would merely involve ordinary skill in the art. In particular, Ashmead et al. teaches that, "Depending on the physical and chemical properties of the individual chemicals being processed, or the two or more chemicals being reacted, one skilled in the art can design an apparatus having the requisite size, shape and throughput of tortuous channel and the number, and geometry, of the various laminae," (column 5, lines 57-64).

Regarding claim 18, Ashmead et al. discloses at least one feed channel (i.e., communicating with vertical passage 87V, manifold chamber 90C1'; FIG. 16; column 12, line 66 to column 13, line 8), which feed channel leads into the reaction space 90-1' to 90-8' through at least one of the lateral surfaces of the wall elements.

Regarding claims 19 and 20, Ashmead et al. discloses a distributing medium through which the reaction spaces are capable of being provided with the reactants, wherein the distributing medium may comprise a solid body with a plurality of channels (i.e., channels of inlet distribution manifolds 40, 44, in the case of plural reactants; FIG. 2, 7; column 10, lines 36-55), the cross-sections of which may be chosen to be sufficiently small to avoid spreading of flames in the course of the supply of explosive reactants (column 8, lines 15-29).

Regarding claim 22, Ashmead et al. discloses that the slot width "s" of the reaction spaces amounts to between 0.05 and 5 mm, whereby in case of explosive reaction mixtures the

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slot width “s” of the reaction spaces is chosen sufficiently small in order to avoid spreading of flames (e.g., channel cross-sections from about 10 to about 5000 micrometers; column 3, lines 42-52; column 6, lines 10-21).

Regarding claims 23 and 24, Ashmead et al. discloses the reaction spaces **90-1'** to **90-8'** are either filled with granular catalyst or at least partially coated with catalyst material (e.g., packed with catalyst beads, not shown, or deposited with one or more layers of catalytic material; column 13, lines 1-4; FIG. 16).

Regarding claim 25, Ashmead is silent as to the lateral surfaces of the wall elements facing towards the reaction spaces being provided with a profiled structure for the purpose of enlarging the surface area. However, Ashmead discloses that, “a series of channels **74C** and mesas **74M** are formed in the top surface of wafer **600** the increase the surface area to enhance heat transfer,” (column 11, line 58 to column 12, line 7). It would have therefore been obvious for one of ordinary skill in the art at the time the invention was made to provide a profiled structure to the reaction spaces in the apparatus of Ashmead, in order to enhance the heat transfer to or from the reaction being conducted within the reaction spaces.

Regarding claims 26-30, as shown in FIG. 1 and FIG. 2, Ashmead discloses that a plate **100** is provided with one or more inlet ports **20** and **24** to enable the flow of reactants into the apparatus, and one or more outlet ports **30** and **34** to enable the flow of products from the apparatus. However, Ashmead further discloses that, “... the inlet ports **20** and **24** and the outlet ports **30** and **34** do not necessarily have to be positioned through the outer groups. These elements could be designed to meet the integral structure at the side of a lamina, for example.” (column 8, lines 44-56). Additionally, FIG. 4 illustrates a plurality of ports **75** and **76** located at

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the side of a lamina for conducting heat transfer media. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide plates at the sides of the lamina (to cover the narrow sides of the wall elements) for an appropriate feeding and discharge configuration of reactants and/or heat carrier into and out from the wall elements in the apparatus of Ashmead, on the basis of suitability for the intended use, because the shifting of location of parts merely involves ordinary skill in the art, as evidenced by Ashmead, above.

Regarding claim 36, Ashmead et al. teaches that, "Depending on the physical and chemical properties of the individual chemicals being processed, or the two or more chemicals being reacted, one skilled in the art can design an apparatus having the requisite size, shape and throughput of tortuous channel and the number, and geometry, of the various laminae," (column 5, lines 57-64). Thus, it would have been obvious for one of ordinary skill in the art at the time the invention was made to vary and select an appropriate slot width for the reaction spaces in the apparatus of Ashmead, on the basis of suitability for the chemicals being processed.

8. Claims 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schubert et al. (US 5,803,600) in view of Stancliffe (US 1,662,870).

The same comments with respect to Schubert et al. apply. However, Schubert et al. is silent as to providing the instantly recited plates at the narrow sides of the wall elements, for the feeding and discharge of reactants and/or heat carrier into and out from the wall elements. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such plates to the apparatus of Schubert et al., on the basis of suitability for the intended use, because such plates would provide a well known means for enabling the disclosed supply and discharge of reactants and/or heat carrier to the apparatus of Schubert et al.

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Stancliffe (FIG. 1) teaches a similar heat exchange apparatus comprising a plurality of wall elements **a,b** which define a plurality of grooves **c,d**, and in particular, the apparatus comprises plates **k** which cover the narrow sides of the wall elements **a,b**, in which are located openings **m** for feeding and drainage of fluids from the wall elements.

9. Claims 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schubert et al. (US 5,803,600).

Regarding claims 33-35, Schubert et al. further discloses a partition being mounted onto the distributing medium and two connecting sockets for feeding the two reactants **A** and **B** (see FIG. 1d, wherein fluids **A** and **B** are supplied to the distributing medium/guide structure via separate admission chamber **8** and **9**; column 3, lines 21-31). Although Schubert et al. is silent as to the wall elements being accommodated as a block in a pressure vessel, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a pressure vessel to the apparatus of Schubert et al., on the basis of suitability for the intended use, because it is well known in the art to conduct reactions within a pressure vessel if the reaction is to be carried out at a high pressure.

Regarding claim 36, the slot width ("s") of the reaction spaces **12a** approximates the particular thicknesses of the foils defining channels **13a** and **13b**, which thereby function as spacers to define the width of the reaction spaces **12a**. As disclosed, the thickness of a given foil layer is about 100 micrometers (column 1, line 64 to column 2, line 14). Schubert et al., however, is silent as to varying the thickness of the spacers in order to vary the slot width of the reaction spaces **12a**. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to vary the thickness of the spacers in order to vary the slot

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width for the reaction spaces **12a** in the apparatus of Schubert et al., on the basis of suitability for the intended use, because changes in size merely involves routine skill in the art, and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

10. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vu et al. (US 4,820,495).

Vu et al. discloses that a layer **43** of solid particles may be provided at the base of the reactor block, to enable easy catalyst withdrawal without disassembling the reactor and its internal parts. The solid particles are characterized by an average diameter from one-half to one-thousandth the average diameter of the catalyst particles (column 5, lines 16-35). Vu et al. further discloses that in the present process, the gas charge may instead be introduced via the bottom of the reactor (column 5, line 66 to column 6, line 2). According to such a configuration, the layer **43** of solid particles functions as the instantly claimed distributing medium. Although Vu et al. is silent as to whether the particles sizes and interspaces are sufficiently small to avoid spreading of flames due to explosive reactants, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate size for the particles and interspaces of layer **43** in the apparatus of Vu et al., on the basis of suitability for the intended use, because changes in size merely involves routine skill in the art, and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.


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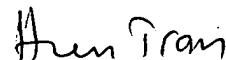
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer A. Leung
January 12, 2005 



**HIEN TRAN
PRIMARY EXAMINER**